

## VARIATION IN HABRODAIS GRUNUS (BOISDUVAL) (Lepid.: Lycaenidae)

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*Habrodais grunus* (Bdv.) displays a considerable amount of geographical variation. It is unfortunately one of those species collected by M. Lorquin for Boisduval, the specimens of which were not marked as to locality. We have a very good clue in the preface of Boisduval's "Lépidoptères de la Californie" that helps to ascertain the general region from which this species was first obtained. Boisduval says:<sup>1</sup>

"A naturalist known widely through his zeal and his love of science, M. Lorquin, seduced like the others by this brilliant mirage, embarked also for California, with the purpose of re-making a fortune of which he had been so unworthily stripped. He left in 1849 with his heart filled with hope, believing that in this el dorado it was only necessary, so to speak, to stoop to pick up gold nuggets.

"Once on the ground, without allowing himself any rest, he hastened to devote himself to the placer claims, worked as a digger, with as much courage as energy, finding from time to time some pieces of the precious metal, but the gain which he derived from it after heavy toiling was insufficient for him to procure the things most indispensable to life, in a country wherein everything was at a fabulous price: thirty francs for a dozen eggs! And the rest in proportion.

"Scarcely knowing which way to turn, he girded himself against adversity, left the placers, returned to San Francisco, and putting all personal feeling aside, he did like many others; he practiced various employments quite apart from his habit, which permitted him to live and to make a little money. From this moment dates the honorable position he has acquired today by force of economy, work and perseverance.

"Become freer of his time and having with him his family which had come to rejoin him, he felt the love of natural sciences and especially of entomology reawaken within him. In order to devote himself to his liking, he did not fear to suffer fearsome privations and great fatigues: he explored at first all the environs of San Francisco, then the borders of the Sacra-

<sup>1</sup> Translated from the original French by M. E. Griffith, Univ. of Kan., Lawrence, Kan.

mento and of the Feather Rivers, made trips in the chain of the Sierra-Nevada Mountains and adventured even in the forests of the interior, braving the jaws of bears and the fangs of rattlesnakes.

"These dangerous excursions made during two years in diverse seasons furnished him with some good insect collections, of which he sent us eighteen years ago two very remarkable series. A large part of the Lepidoptera being unknown and entirely new, we published their descriptions in the Annals of the Entomological Society of France,<sup>2</sup> in the form of a small local fauna. Since this period, the zeal of M. Lorquin did not diminish, on the contrary, having more leisure, he undertook journeys into some unexplored regions: he visited the northern mountains, penetrated much farther in the east and made his way later among the Apaches as far as Los Angeles in Sonora. The result of the collections made in these diverse parts of California fully justified that which might be expected of a man such as M. Lorquin. This indefatigable entomologist sent us three successive series of specimens collected in these different localities, enclosing each time a great number of new forms of which the figure surpasses that of the species which we have made known in the faunal note mentioned above." The species taken on these later journeys were published in the paper from which the above quotation is taken, "Annales de la Société Entomologique de Belgique," vol. XII, pages 8-94, 1869.

The original description of *Habrodais grunus* appears on page 289 of the first work mentioned. This eliminates as the type locality the localities collected by Lorquin in his second series of journeys. The possible localities then that Lorquin may have taken the type series in are: San Francisco, the borders of the Sacramento and of the Feather rivers or some locality in the Sierra-Nevada mountains such as Plumas, Sierra, Nevada or perhaps Placer counties. Since the food plant of *grunus* (*Quercus chrysolepis* Liebm.) does not grow in the floor of these river valleys we may safely assume that *grunus* does not fly there. Further I have no records of *grunus* having been taken there. Specimens from any of the Sierra-Nevada counties are of the same subspecies so that we have to decide whether Lorquin's specimens came from near San Francisco or from the Sierra-Nevada Mountains.

A translation of the original description of *grunus* would read as follows: "Wings above fuscous, blending toward the disc fulvescent; underneath a whitish yellow, obsolescent, slightly wavy line, placed in the middle; two obsolete yellow lunules at the rear. This species, of which we only know the females in fairly poor condition is distinguished from our European species by the surfaces. The shape of *quercus*. The top of the

<sup>2</sup> 2nd series, vol. x, pages 275-325, 1852.

wings brown with the disc of a dull reddish, especially on the inferiors. Underneath pale yellowish crossed a little beyond the middle by a sinuous line, not very distinct and ferruginous red. The anal part of the secondaries marked to the right and to the left of the tail by a little lunular reddish yellow obsolete crescent, capped by a blackish crescent. Mr. Lorquin only found three individual females which seems to indicate that this species was passed when he went through the district."

Comparing a series of *grunus* from Contra Costa County, which is near San Francisco, with a series from Nevada County, and both of these with the above description, indicates that the types are from the Sierra-Nevada Mountains. It should be remembered that Boisduval's description is based on badly worn material; nevertheless there are statements in this description that are helpful. In a large series of specimens from Mt. Diablo, Contra Costa County, all but a very few specimens have a well defined marginal row of crescents on the underside of the secondaries. These crescents are black, faintly outlined on the inner side by blue. In specimens from Donner Lake, Nevada County, the crescents near the anal angle are usually the only ones remaining, the others are completely gone or only very faintly indicated. Boisduval only mentions those near the anal angle. He also says that the sinuous line placed in the middle of the wings underneath is not very distinct. Specimens from Nevada County show a far less distinct sinuous line in this area than specimens from Contra Costa County. Indeed in the latter there is a very distinct "ferruginous red" sinuous line, this line being made more apparent by whitish-yellow along its outer side in the great majority of specimens. These comparisons indicate that Boisduval's types came from the Sierra-Nevada Mountains.

Mr. Charles Oberthür gives an illustration of *grunus* from the Boisduval collection in figure 1923, Pl. CCXXXV of his "Études de Lépidoptérologie Comparée." This figure cannot be of one of the original type specimens as it does not agree with the above description in two important characters. His figure lacks the "little lunular reddish yellow obsolete crescent capped by a blackish crescent." This reddish yellow spot is of minor value in setting aside a subspecies but is valuable in identifying a particular specimen. Individual specimens may or may not have this spot. The original specimens had on the upper surfaces "a disc of dull reddish, especially on the inferiors." This does not agree with Oberthür's figure; however his figure does agree perfectly with Boisduval's second description of *grunus* published some seventeen years later. Oberthür's figure then represents a metatype of Boisduval's but not a specimen from the original series.

M. Lorquin later collected specimens of *grunus* probably in southern California and upon receiving these Boisduval re-

described the species in his second paper on Californian butterflies. This description which appears on page 45 of his "Lépidoptères de la Californie" published in the "Annales de la Société Entomologique de Belgique," vol. XII, 1869, is translated as follows: "We had not seen this species except in very bad condition. We have since received absolutely perfect individuals of the two sexes which permit us to rectify our description. On the top it is of a ferruginous red-brown with the extremities copiously blackish especially in the male. The underside of the fore wings is entirely of a yellow ochre. The underside of the hind wings present a series of little bluish crescents edged with black toward the rear and preceded by a little sinuous whitish indefinite line. Our first description made on a poor specimen is entirely incorrect with respect to the underside of the lower wings."

This description agrees very well with specimens from the San Jacinto Mountains. These latter are identical with specimens from the Sierra-Nevada Mountains and both represent typical *grunus*. With the discovery of two new subspecies and because of the briefness of Boisduval's descriptions it seems advisable to give a complete description of typical *grunus* along with the description of the new subspecies.

#### HABRODAIS GRUNUS GRUNUS Boisduval

Size: These measurements are taken by measuring the number of millimeters between the inner angle of one of the fore wings and the vertex of the same wing. The smallest male measured 15 mm., the largest 16 mm. The smallest female 16 and the largest 17. The average female wing length was 16.5 and that of the male 15.6. The average wing length of all specimens of both sexes was 16 mm.

Upper surfaces: Ground color dark brown becoming gradually darker toward the vertex of the primaries and toward the outer margin of the secondaries. The disc of the primaries is orange brown. This same color is faintly indicated on the secondaries. There is a median streak of orange brown on the tail.

Under surfaces: Ground color light ochre, a sinuous mesial band of a darker brown running through the entire width of the secondaries and through the anterior two-thirds of the primaries. This band is outlined on the outer side by a thin, inconspicuous line of white which in a very small percent of the specimens (10%) is nearly eradicated by the ground color. A fraction over a millimeter in from the exterior margins of the secondaries there is an internerval row of small black crescents capped with blue. These crescents are well defined near the anal angle and are only faintly indicated in the rest of the row. Indeed, in eighty percent of the specimens of typical *grunus*

before me these crescents are almost completely gone except in the anal area. At the end of the cell in both primaries and secondaries there is a faint light bar faintly outlined on both sides by a brown line, about the same color as the mesial line. In eighty percent of the specimens the crescent above the tail has inside a small black or reddish point. The area immediately around this point and between it and the crescent is faintly orange. The females of typical *grunus* hardly differ from the males. They seem to have a mesial band that is a trifle more distinct with perhaps a little more white on the outside of that band.

Note: I have examined specimens of this subspecies from the following localities: Pass west of Donner Lake, Nevada Co., California, July 31, 1935, elevation 6,600 ft., collectors H. H. Brown and F. M. Brown; Placer Co., California, July 12, 1899; Yosemite National Park; Twin Falls, Idaho, June 28, 1930; Idylwild, San Jacinto Mountains, California, July 30, 1933, collector L. Hulbert; same locality various dates in July, 1936, collectors, R. H. Beamer, J. D. Beamer, M. Jackson and W. D. Field; Camp Baldy, San Bernardino Co., California, August 9, 1927, collector J. S. Garth; various dates from the San Gabriel Mts., California, and from Sheep Canyon, San Bernardino Mts., California.

#### HABRODAIS GRUNUS LORQUINI subsp. nov.

Size: Smallest male 15 mm., largest male 16 mm. Smallest female 14 mm., largest female 16 mm. The average length of anterior wings in male and in female is 15.46 and 15.20 mm., respectively. The average of both sexes is 15.33.

Upper surfaces: Ground color a little darker than in *grunus grunus* with a more reduced disc.

Under surfaces: Ground color of a darker ochre than in *grunus grunus*. The sinuous mesial band is a little wider and of a much darker brown than in typical *grunus*, and much more conspicuous. The light outline is more evident. The marginal row of crescents have less blue outlining them toward the inside of the wing. This row is well defined throughout the border of the wing in the majority of the specimens. In some specimens this row is reduced to mere points or is partially missing. The faint light bar outlined by brown in typical *grunus* is here about the same color as the ground color, outlined more distinctly by brown which is again the same brown as that of the mesial band. The small black point and the surrounding orange within the crescent above the tail is absent except in about twenty-five percent of the specimens. The females differ by being of a slightly lighter ground color.

Note: Two specimens from Mt. Diablo and two from Santa Cruz, California, differ from typical *lorquini* in being



brown instead of ochraceous underneath. Five specimens from Mt. Diablo have the sinuous mesial band on the underside of the wings entirely or almost entirely missing.

Data: Holotype ♂ and allotype ♀, Mt. Diablo, Contra Costa Co., California, August 1, 1932. Eleven ♂ and two ♀ paratypes, same locality and date. Two ♀ paratypes, Trinity Co., California, July 5, 1931. These types in the collection of F. Martin Brown, Colorado Springs, Colorado. Eight ♂ and two ♀ paratypes, Santa Cruz, California, July 20, 1935, collector J. W. Tilden. One ♂ paratype, Santa Cruz, California, July 21, 1932, J. W. Tilden. These types in the collections of the author and of J. W. Tilden.

#### HABRODAIS GRUNUS LORQUINI NOV. f. CHLORIS

Size: Smallest male 12.5 mm., largest male 15 mm. Smallest female 13 mm., largest female 15 mm.. Average length of anterior wings in male 13.67 mm. and in the female 14.36 mm. The average of both sexes is 14.01 mm.

Upper surfaces: Ground color much darker than in typical *grunus*, with a greatly reduced disc. The orange brown color of the disc is greatly suffused with blackish.

Under surfaces: Male: Ground color in the majority of specimens of a very light ochre. In a few specimens this ochre becomes the same dark ochre as in typical *lorquini*. In the great majority of specimens the mesial band is broken up and is not as wide or as distinct as in typical *grunus lorquini*. In about fifty percent of the specimens the marginal row of crescents is a little blacker, with even less blue than in the second brood of *lorquini* (late summer material). In the remaining fifty percent this band is only faintly indicated. In this character the first brood seems to be bridging the second brood of the coastal race with the inland race. The bar at the end of the cell is much fainter than in either *grunus lorquini* or *grunus grunus*. The same black point that is present in about eighty percent of typical *grunus* and in about twenty-five percent of *grunus lorquini* is present in only twenty percent of the specimens of this spring form of *lorquini*. Female: Differs from the male in being of a much lighter, almost whitish ochre ground color.

Data: Holotype and allotype, ♂ and ♀, Mt. Diablo, Contra Costa Co., California, June 17, 1931. Thirty-three ♂ and eleven ♀ paratypes, same locality, June 16-17, 1931. One pair of paratypes in the collection of the Los Angeles Museum and one pair in the author's collection. The rest in the collection of F. M. Brown, Colorado Springs, Colorado.

Note: Mr. J. W. Tilden is of the opinion that *grunus* is not double brooded. He says in a personal note to the writer,

"This species is always found in connection with the varieties of golden oak (*Q. chrysolepis*), and is as far as I know, single brooded. At least, I have never collected where *Habrodais* was double brooded." The specimens I have from Mr. Tilden are specimens taken late in July near Santa Cruz. The species may be single brooded there. However, Contra Costa County material, as well as that from Los Angeles County seem to divide into two broods according to the dates of collection, one in June and the other in late July or early August. If all of the subspecies of *grunus* are single brooded then there is certainly a long period of flight and of emergence. At any rate *lorquini* is separable into two forms, a spring and a summer form, by the characters given above. Apparently there is no difference in color pattern between the two broods or between the two extremes of the long period of flight, whichever it is, of typical *grunus grunus*.

HABRODAIS GRUNUS HERRI nov. subsp.

Size: Length of anterior wing 17 mm.

Upper surfaces: Disc of the fore wings greatly extended and light yellowish in color. The margin narrower than in typical *grunus* and sharply defined by the light yellow color of the disc. The margin is the same dark brown color present in typical *grunus*. Secondaries similar to primaries except that the dark brown color of the margin is present in the base of the wing and scattered lightly over the light yellow colored disc.

Under surfaces: Ground color a little brighter than in typical *grunus*. All markings are very faint, almost obliterated.

Data: Holotype ♂, McKenzie (Sister's) Pass, Oregon, August 28, 1936, collector C. W. Herr. One ♂ paratype, same locality and date. One ♂ paratype, same locality, September 1, 1936. All types in the author's collection.

